

Patent Claims

1. A lightweight valve (1), in particular for internal combustion engines, comprising a valve stem (3), a hollow valve cone (7) and a valve disk (9) closing the valve cone (7), the valve stem (3) being provided with a hollow space (5) at its end facing the valve disk (9), characterized by at least one force transmission element (19) which is provided on the valve disk (9) and extends through the hollow valve cone (7) into the stem hollow space (5).
2. The lightweight valve as claimed in claim 1, characterized in that the force transmission element (19) projects in a dome-like manner above that flat side of the valve disk (9) facing the valve cone (7).
3. The lightweight valve as claimed in claim 1 or 2, characterized in that the force transmission element (19) is designed on the valve disk (9).
4. The lightweight valve as claimed in one of claims 1 to 3, characterized by a central arrangement of the force transmission element (19) on the valve disk (9).
5. The lightweight valve as claimed in one of claims 1 to 4, characterized in that the stem hollow space (5) is provided with an axial stop (25), preferably an axial stop shoulder of all-round design, against which the force transmission element (19) is applied with its end face.
6. The lightweight valve as claimed in claim 5, characterized in that the stop surface (23) of the force transmission element (19) extends at right angles or in a direction at right angles to the longitudinal central axis of the valve stem (3).
7. The lightweight valve as claimed in one of claims 1 to 6, characterized in that the force transmission element (19) has a constant cross section essentially over its entire length.

8. The lightweight valve as claimed in one of claims 1 to 6, characterized in that the free end of the force transmission element (19) is inclined, in particular designed with a taper.
9. The lightweight valve as claimed in one of claims 1 to 8, characterized in that the force transmission element (19) is provided with a bearing surface (31) extending in the direction of the longitudinal central axis of the force transmission element (19) and preferably of all-round design which bears flat against a correspondingly designed countersurface (33) designed in the stem hollow space (5) and if appropriate on an inner wall of the hollow valve cone (7).
10. The lightweight valve as claimed in claim 9, characterized in that the countersurface (33) is provided with at least one recess (35) preferably of all-round design for forming a positive connection between force transmission element (19) and valve stem (3).
11. The lightweight valve as claimed in one of claims 1 to 10, characterized in that a blind hole (27) is provided in the end face (21) of the force transmission element (19).
12. The lightweight valve as claimed in one of claims 1 to 11, characterized in that the valve cone (7) is formed by a tulip-shaped widening of the valve stem end.
13. The lightweight valve as claimed in one of claims 1 to 12, characterized in that the force transmission element (19) is connected to the valve stem (3) by means of a material, non-positive and/or positive connection.
14. The lightweight valve as claimed in one of claims 1 to 13, characterized in that the valve cone (7) is connected to the valve disk (9) by means of a material connection.
15. The lightweight valve as claimed in one of claims 1 to 14, characterized in that the connection between force transmission element (19) and valve stem (3) is designed in such a way that the forces acting on the valve disk (9) during operation are introduced essentially completely via the force transmission element (19) into the valve stem (3).

16. The lightweight valve as claimed in one of claims 1 to 15, characterized in that the valve disk (9) has a supporting portion (37) against which the valve cone (7) bears flat in sections in its end region of greater diameter.

17. A method for manufacturing a lightweight valve (1) as claimed in one of claims 1 to 16, with the following steps:

- production of a first preferably one-piece component forming the valve disk (9) and the force transmission element (19) by casting, forming and/or by means of a powder metallurgy method,
- production of a second preferably one-piece component forming the valve stem (3) and the valve cone (7) and
- joining the first and second components together and connecting them by means of a material, non-positive and/or positive connection.

18. The method as claimed in claim 17, characterized in that the valve stem (3) is subsequently hardened, preferably inductively hardened, in its end region facing away from the valve disk (9).

19. The method as claimed in claim 17 or 18, characterized in that the valve cone (7) and the valve disk (9) are subsequently welded together, preferably by means of a beam welding or fusion welding method.

20. The method as claimed in one of claims 17 to 19, characterized in that the outer surface of the lightweight valve (1) is provided with a protective layer by means of plating.